

PCI 1000 Base-T and 1000 Base-SX Installation Guide

HP-UX, ~~Windows, & Linux~~ Networking



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Localized Documentation

This Installation Guide has been translated to:

<http://www.docs.hp.com/ja/index.html>

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1 PCI 1000 Base-T and 1000 Base-SX Installation

This chapter provides instructions for installing the PCI 1000Base-T and 1000Base-SX (fiber) cards on HP-UX 11i v 2.0 or later. This chapter contains the following sections:

- “Installation”

- “Configure Jumbo Frame Size”
- “Network Card Configuration Worksheet”
- “PCI 1000Base-T and 1000Base-SX Quick Troubleshooting”

Thank you for purchasing HP I/O Cards

If you are installing an HP I/O card as an add-in device, please review this document before attempting installation.

If an HP I/O card was factory installed in your server, you can skip to Step 7 on page 11 to verify the installation.

HP welcomes your input. Please email us at: netinfo_feedback@cup.hp.com with comments or suggestions on HP I/O Cards or related documentation.

All product documentation, including a comprehensive support guide, installation guide, release notes, as well as information on supported servers, HP-UX versions, drivers, and patches, is available online at: <http://docs.hp.com>

1. Click on “browse by topic”.
2. Click on “networking and communications”.
3. Click on the appropriate product category.

Installation

These instructions apply to PCI 1000Base-T and 1000Base-SX (fiber) cards on HP-UX 11i v 2.0 or later. The Base-T cards operate at 10 or 100 Mbit/s in either full- or half-duplex modes and at 1000 Mbps only in full-duplex mode. The 1000Base-SX cards operate only at 1000 Mbps and in full-duplex mode. Ensure that your switch is set to autonegotiation or the same speed and duplex mode as this card.

For information on online addition and replacement or for advanced troubleshooting, refer to the online *Ethernet Support Guide*. The Support Guide and Release Notes are available at <http://docs.hp.com> and, if you have a support contract, on the Instant Information CD.

NOTE	If PCI 1000Base-T is built-in, or if you have ordered factory pre-installation, you will not need to perform the following hardware and software installation steps.
-------------	--

Step 1. Access the system card bay.

- a. If the system is running, shut it down by executing:

```
shutdown -h
```


Respond “**y**” to continue to shutdown prompt.
- b. Wait for the system to shutdown completely, and then power off the system by pressing the system off button. Ensure that the system is grounded.
- c. Open the system to gain access to the PCI backplane.
- d. Select an empty PCI slot and remove the slot cover.

Step 2. Install the card.

- a. Observe the antistatic precautions.
- b. Record the serial number located on the card for future reference.
- c. Grasp the card by its edges or faceplate with both hands, insert the card into the slot, and firmly but gently press the card in until it is fully seated.
- d. Secure the card and reassemble the system.

Step 3. Connect the card to the network.

- a. Attach the network cable to the card. For 1000Base-SX, cabling can be either 62.5 micron or 50 micron multimode fiber optic cable. For 1000Base-T, cabling must be Cat 5 or 5E UTP. Refer to the table on page 4 for operating distances.
- b. Attach the free end of the cable to any unused port on the switch. Ensure power cable is connected to system. Ensure that the 1000 Mbps port on the switch is set for autonegotiation.
- c. If using Jumbo Ethernet frames, ensure that all end stations on a given LAN (that is, no routers or layer 3 switches in between) have the same MTU setting. However switch ports in the LAN can have any MTU setting greater than or equal to the end station MTU.
- d. Power up the system.

Step 4. Prepare to install the software.

- a. Log in as **root**.
- b. Check that the `/usr/bin`, `/usr/sbin`, and `/sbin` directories are in your `PATH` using the command:

```
echo $PATH
```
- c. Check the HP-UX version by executing:

```
uname -r
```

The version must be B.11.23 (11i v 2.0) or later.
- d. Install the appropriate patches for your system as described in the “Required Software” section of the Release Notes, which is available on the web at <http://docs.hp.com> under “Networking and Communications.”

Step 5. Install the software.

NOTE The GigEther-00 and GigEther-01 product software bundles are always installed as part of your operating environment. Therefore, if you have a system that has HP-UX 11i or later, *and* your networking or I/O product was either factory installed or was shipped before your system’s Operating Environment was released, you can ignore the following software installation procedure. However, you will need to install the software if you are:

- *adding* a networking or I/O card to a system *and*
 - the networking or I/O card is newer than your system’s Operating Environment
-

- a. Load the software media into the appropriate drive.
- b. Run the *swinstall* program to install the software using the command:

```
swinstall
```
- c. Change the host name after “Source Host Name,” if necessary.
- d. Click on the Source Depot Path to identify the registered depot for the appropriate source depot path and activate the **OK** button to return to the Software Selection Window.
- e. Highlight the 1000Base-SX/T software:
 - GigEther-00 (for cards such as A4926A and A4929A) on HP-UX 11i v 2.0, *or*
 - GigEther-01 (for cards such as A6825A and A6847A) on HP-UX 11i v 2.0. Check the Release Notes, the Support Guide, or ask your HP representative for a list of the latest cards supported.
- f. Choose Mark for Install from the “Actions” menu to choose the product to be installed.
- g. Choose Install from the “Actions” menu to begin product installation and open the Install Analysis Window.

- h. Activate the **OK** button in the Install Analysis Window when the Status field displays a Ready message.
- i. Activate the **YES** button at the Confirmation Window to confirm that you want to install the software. *swinstall* loads the fileset, runs the control scripts for the filesets, and builds the kernel. This should take about 3 to 5 minutes. When the status field indicates Ready, click **DONE**. A Note Window then opens. Activate the **OK** button to reboot the system.

Step 6. Configure the card using SAM.

- a. Log in as **root** and verify that the card and its hardware path are displayed by executing:
`ioscan`
- b. Run the System Administration Manager:
`sam`
- c. Double-click **Networking and Communications**.
- d. Double-click **Networking Interface Cards**.
- e. Highlight the Gigabit Ethernet card and choose **Configure** from the **Actions** menu.
- f. Fill in the form according to the instructions using the Network Card Configuration Worksheet on page 2.
- g. Activate the **OK** button to activate the card and then select exit from the “File” menu until you exit SAM.

Step 7. Verify the installation.

- a. Verify that the connector’s Link LED is steadily on (this means the card and driver are installed successfully).

NOTE

On cards that have them, speed LEDs indicate not only speed but also that there is a LAN connection. The link indication will occur before data activity indication. If the card and driver have been installed, but there is no LAN connection, all speed LEDs will be OFF.

- b. Obtain the PPA number and the station address of each card by using the `lanscan(1M)` command.
- c. Verify link-level connectivity with a remote system by executing:
`linkloop -i PPA_number remote_station_address`
- d. Verify IP-level connectivity with a remote system by executing:
`ping Remote_IP_Address`
`netstat -in`
Installation is complete when you have successfully run `linkloop` and `ping`.

Step 8. To configure remote systems, refer to *Installing and Administering HP-UX LAN* available on the web at <http://docs.hp.com>. Do this step only if remote systems have not been previously configured.

Step 9. Optional Step: Configure Jumbo Frame Size (Jumbo Frames only supported at 1000 Mbit/s)

Configure Jumbo Frame Size

An optional step is to configure jumbo frame size.

NOTE Jumbo frames are only supported at 1000 Mbit/s.

Jumbo frames are in the range of 1501-9000 bytes. If using Jumbo Ethernet frames, ensure that all end stations on a given LAN (that is, no routers or layer 3 switches in between) have the same MTU setting. However switch ports in the LAN can have any MTU setting greater than or equal to the end station MTU.

Step 1. Obtain the PPA number of the card by executing:

```
lanscan
```

Step 2. Choose one of two configuration methods that will permanently save your configuration. You can either:

- Use the GUI-based system admin manager (SAM).
To use SAM, type **sam** at the HP-UX system prompt; then double-click Networking and Communications, and then Advanced Configuration. See the *Ethernet Support Guide* for details and then do the steps for verifying the MTU size; or
- Edit the configuration file in `/etc/rc.config.d/` using an editor such as `vi`. Depending on your driver, the filename can be either `hpgelanconf`, `hpiigelanconf`, or `hpietherconf`. Set the `mtusize` by editing either `HP_GELAN_MTU[0]=mtusize`, `HP_IGELAN_MTU[0]=mtusize`, or `HP_IETHER_MTU[0]=mtusize`, and insert the proper interface name: `HP_GELAN_INTERFACE_NAME`, `HP_IGELAN_INTERFACE_NAME`, or `HP_IETHER_INTERFACE_NAME`. When the system reboots, the interface will be configured for jumbo frame operation.

Step 3. Verify MTU change by executing:

```
netstat -rn
```

If MTU has not changed, execute the following commands:

```
ifconfig lan PPA_number unplumb
```

```
ifconfig lan PPA_number ip_address netmask netmask up
```

Step 4. To check (or verify) the current Ethernet frame size, execute:

```
lanadmin -m PPA_number
```

An alternative way to temporarily configure jumbo frame size is to execute the following command:

```
lanadmin -M mtu_size PPA_number
```

The PPA number is the one we obtained from the output of `lanscan`. Jumbo frames are in the range of 1501-9000 bytes.

NOTE Using `lanadmin` will not preserve your settings across reboots.

Network Card Configuration Worksheet

Fill out one worksheet for each network card you are installing.

Table 1-1 Network Card Configuration Worksheet

Data Type	Required/ Optional	Default	Where to Configure	Example	Your System
Internet address	Required	0.0.0.0	SAM or ifconfig	196.6.20.2	
Subnet mask	Required if using subnetting	Subnet mask not used	SAM or ifconfig	255.255.248.0	
Station address	Built-in but can be optionally changed	As shown on card	lanadmin -A or SAM	0x0060b0c4012f	
Host name alias for this network interface (card)	Required if system is connected to more than 1 network	None	SAM	system1	
Link configuration	Required	Autonegotiating	lanadmin -X or SAM	lanadmin -X auto_on <i>ppa#</i> (if already turned off)	
Link speed/duplex mode	Required	Autonegotiating	Hub or switch ^a and lanadmin -X or SAM	lanadmin -X 100fd <i>ppa#</i>	
MTU (Maximum Transmission Unit): Jumbo Frames	Optional	1500 bytes	lanadmin -M or SAM	lanadmin -M 9000 <i>ppa#</i> ^b	
Receive flow control	Optional	On	lanadmin -X or SAM	lanadmin -X fctrl off	

- a. The speed configuration of the 1000Base-T card can be 10, 100, or 1000Mbps and is determined by the speed setting of the switch port to which the card is connected. The card automatically senses this speed. The card only runs at one speed at a time. To verify the speed selection, run `lanadmin -x ppa#`.
- b. The valid MTU range is 1024 - 9000; for Jumbo Frames, the valid MTU size is 1501 - 9000.

PCI 1000Base-T and 1000Base-SX Quick Troubleshooting

Use the following steps in sequence to quickly isolate PCI 1000Base-T/SX problems on your system. The flowcharts referred to in these steps are in the online *HP-UX Ethernet Support Guide*.

Step 1. Check the HP-UX Directory Path

Prior to completing the following steps, check that the `/usr/bin`, `/usr/sbin`, and `/sbin` directories are in your `PATH`. Execute:

```
echo $PATH.
```

Step 2. Cable/LED Test

- a. Check that the network cable is connected to the Gigabit Ethernet card and to a Gigabit Ethernet card/switch. Ensure that the 1000 Mbps card/switch is set for autonegotiation and full-duplex. For 1000Base-T, if manually configuring, ensure the speed, duplexity, and autonegotiation settings are the same on the card and switch.

- b. Check that the card's Link status LED (1000Base-SX) or speed LED (1000Base-T) is on.

Successful? Yes, if the Link status or speed LED is on. If not, refer to flowchart 1.

Step 3. Link Level Test

- a. Check the link layer connectivity using the `linkloop(1M)` command with the PPA number of your Gigabit Ethernet card and the station address of the remote host. Execute:

```
linkloop -i PPA_number remote_station_address
```

Use `lanscan(1M)` to obtain the PPA number and station address of the remote system.

- b. Successful? Yes, if an OK status is returned. If not, refer to flowchart 2.

Step 4. Network Level Test

- a. Check that a correct entry exists for the remote system in your system's ARP cache using the `arp(1M)` command.

Example: `arp 196.6.20.2`

Successful? Yes, if there is an ARP cache entry for the remote host. If not, refer to flowchart 3a.

- b. Check the IP network level connection with the remote host using the `ping(1M)` command.

Example: `ping 196.6.20.2`

Successful? If packets are being returned, your system has network level connectivity to the remote host. If not, refer to flowchart 3b. Press **<Ctrl> C** to stop the ping output.

Step 5. Transport Level Test

- a. Check the transport level connection with the remote host using the `telnet(1)` command.

Example: `telnet 196.6.20.2`

Successful? Yes, if you have transport level connectivity to the remote host. If not, refer to flowchart 4.

- b. Check the route tables on the source and destination nodes using the command:

`netstat -r`

Successful? If the routing tables are not correct, refer to the route man page.

Step 6. Configuration Test

- a. Check that the 1000Base-SX/T interface is configured by displaying information about all 1000Base-SX/T cards that are successfully bound to the system using the `lanscan(1M)` command.

Successful? Yes, if `lanscan` indicates the hardware state 'up.' If not, refer to flowchart 6a.

- b. Ensure that the 1000 Mbps switch is set to autonegotiate. If the switch cannot autonegotiate, run `lanadmin` and ensure that the speed settings and duplex mode are the same as set at the switch (they can be 10, 100, 1000 and full-duplex or half-duplex mode).

Check the log data (error and disaster messages) for the Gigabit Card using `netfmt(1M)`.

Example: `netfmt -v -f /var/adm/nettl.LOG00`

Successful? Yes, if the problem stated in the log file is fixed. If not, refer to flowchart 6b.

- c. Display IP information about the interface you want to test using the `ifconfig(1M)` command.

Example: `ifconfig lan1.`

Successful? Yes, if the output shows the correct Internet address and the flag: UP. If not, refer to flowchart 6c.

For the Bridge/Gateway Loopback Test, refer to flowchart 5 in the online guide *HP-UX Ethernet Support Guide*.

Step 7. Network Level Test for Jumbo Frames

This step is *only for jumbo frames*. Within a LAN (that is, not across a router or layer 3 switch), MTUs of all end stations must be set equal to each other. This can be verified using administrative commands (for example, `lanadmin -m` on HP-UX). The MTU of bridges and layer 2 switches in the LAN must be set greater than or equal to the MTU value of the end stations.

- a. Ensure that the MTU of the end stations is greater than 1500.
- b. Check IP level connectivity by using `ping(1M)` with a message size greater than 1480.

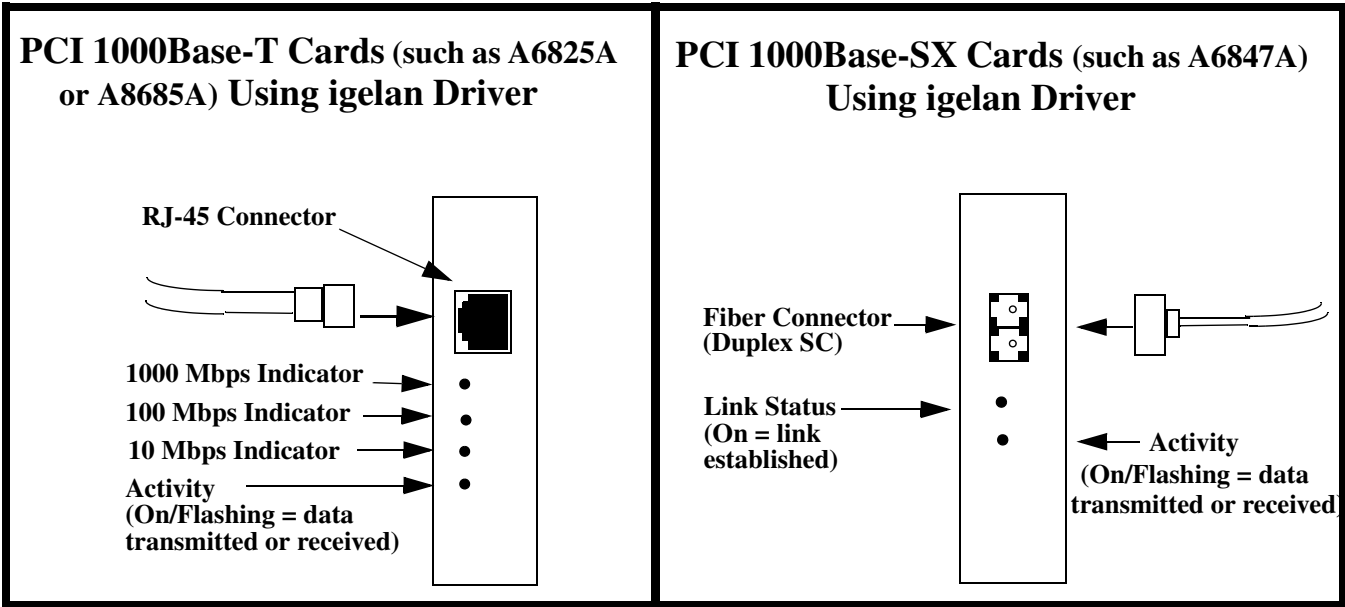
Example: `ping 196.6.20.2 2000`

If there is a response to the ping, jumbo frames messaging is configured correctly.

If not, refer to flowchart 3b. Press **<Ctrl> C** to stop the ping process.

Refer to the on-line manual pages for more detailed information about the commands listed in the previous steps.

If you are still having problems connecting your system to the network, contact your HP support representative.




Operating Distance for 1000Base-T (Copper UTP): Up to 100 meters — Cat 5 and Cat 5E
Operating Distances for 1000Base-SX (Fiber Optic Cable) are as follows:

Description (850nm short wavelength laser)	Modal Bandwidth	Operating Distance
62.5 micron MMF	160 (MHz * km)	2 to 220 meters
	200 (MHz * km)	2 to 275 meters
50 micron MMF	400 (MHz * km)	2 to 500 meters
	500 (MHz * km)	2 to 550 meters

A Declaration of Conformity

Figure A-1 Declaration of Conformity

DECLARATION OF CONFORMITY	
According to ISO/IEC Guide 22 and EN 45014	
Manufacturer's Name:	Hewlett-Packard Company Systems Interconnect Solutions Lab
Manufacturer's Address:	8000 Foothills Blvd. Roseville, CA 95747 USA
declares, that the product	
Product Name:	PCI 1000BT / PCI 1000SX
Model Number(s):	A6825A and A6847A
Product Options:	All
conforms to the following Product Specifications:	
Safety:	IEC 950:1991 + A1, A2, A3, A4 / EN 60950:1992 + A1, A2, A3, A4, A11 GB 4943-1995. IEC 825-1:1993/ EN60825-1:1994+A1, Class 1 Laser
EMC:	CISPR 22:1997 / EN 55022:1998 - Class A CNS 13438, GB 9254-1988, CFR47, Part 15 Class A CISPR 24:1997 / EN 55024:1998 IEC 61000-4-2 IEC 61000-4-3 / ENV 50204 IEC 61000-4-4 IEC 61000-4-6
Supplementary Information:	
The product herewith complies with the requirements of the EMC Directive 89/336/EEC and carries the CE marking accordingly.	
1) The Product was tested in a typical configuration with Hewlett-Packard information technology equipment.	
<div style="text-align: right;">  Tom Le, Hardware Engineer </div>	
Cupertino, CA, April, 2002	
European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department HQ-TRE, Herrenberger Straße 130, D-71034 Böblingen (FAX: + 49-7031-14-3143)	

B Gigabit Ethernet lanadmin Display

This appendix defines the terms listed in the `lanadmin(1M)` command display.

LAN Interface Status Display

The following is a sample of a `lanadmin(1M)` command display. The fields are defined in the section that follows.

HP-UX 10.20 lanadmin output:

```
LAN INTERFACE STATUS DISPLAY
Sun, Jun 21,1998  14:39:36

Network Management ID          = 5
Description                    = lan3 HP 1000Base-SX Adapter HW Rev A-3814
Type (value)                   = ethernet-csmacd(6)
MTU Size                       = 1500
Speed                         = 10000000000
Station Address                = 0x60b0c41121
Administration Status (value) = up(1)
Operation Status (value)      = up(1)
Last Change                    = 1
Inbound Octets                 = 0
Inbound Unicast Packets        = 0
Inbound Non-Unicast Packets    = 0
Inbound Discards               = 0
Inbound Errors                 = 0
Inbound Unknown Protocols      = 0
Outbound Octets                = 0
Outbound Unicast Packets       = 0
Outbound Non-Unicast Packets   = 0
Outbound Discards              = 0
Outbound Errors                = 0
Outbound Queue Length          = 0
Specific                       = 655367

Ethernet-like Statistics Group

Index                         = 5
Alignment Errors              = 0
FCS Errors                    = 0
Single Collision Frames       = 0
Multiple Collision Frames     = 0
Deferred Transmissions        = 0
Late Collisions               = 0
Excessive Collisions          = 0
Internal MAC Transmit Errors  = 0
Carrier Sense Errors          = 0
Frames Too Long               = 0
Internal MAC Receive Errors   = 0
```

HP-UX 11.0 lanadmin output:

LAN INTERFACE STATUS DISPLAY
Sun, Jun 21, 1998 14:49:43

PPA Number	= 3
Description	= lan3 HP 1000Base-SX Adapter HW Rev
A-3814	
Type (value)	= ethernet-csmacd(6)
MTU Size	= 1500
Speed	= 1000000000
Station Address	= 0x60b0c401d4
Administration Status (value)	= up(1)
Operation Status (value)	= up(1)
Last Change	= 14
Inbound Octets	= 2220359858
Inbound Unicast Packets	= 87658661
Inbound Non-Unicast Packets	= 577
Inbound Discards	= 0
Inbound Errors	= 0
Inbound Unknown Protocols	= 0
Outbound Octets	= 2729643634
Outbound Unicast Packets	= 107383997
Outbound Non-Unicast Packets	= 285158
Outbound Discards	= 0
Outbound Errors	= 0
Outbound Queue Length	= 0
Specific	= 655367

Ethernet-like Statistics Group

Index	= 9
Alignment Errors	= 0
FCS Errors	= 0
Single Collision Frames	= 0
Multiple Collision Frames	= 0
Deferred Transmissions	= 0
Late Collisions	= 0
Excessive Collisions	= 0
Internal MAC Transmit Errors	= 0
Carrier Sense Errors	= 0
Frames Too Long	= 0
Internal MAC Receive Errors	= 0

RFC 1213 MIB II

Following are descriptions of the statistics fields in the `lanadmin(1M)` command display. For more detailed information about the fields, refer to RFC 1213.

Field	Description						
Network Management ID	A unique ID assigned by the system for the network management of each network interface.						
PPA Number	A unique number assigned to each network interface, distinct from NMID.						
Description	A textual string containing information about the interface.						
Type (value)	<p>The type of interface, distinguished according to the physical/link protocols, immediately below the network layer in the protocol stack.</p> <p>Gigabit Ethernet can have one of the following values: <i>ethernet</i> or <i>IEEE 802.3</i>.</p>						
MTU Size	The size of the largest datagram which can be sent/received on the interface specified in octets. This value can be 1500 or 9000.						
Speed in bits per second	The speed of the card — 1000 Mbps for 1000Base-SX and 10, 100, or 1000 Mbps for 1000Base-T.						
Station Address	The interface address at the protocol layer immediately below the network layer in the protocol stack. For interfaces which do not have such an address, such as serial line, this object contains an octet string of zero length.						
Administration Status	<p>The status of the card. This parameter is set to <code>up(1)</code> and is not configurable. It will have one of the following values:</p> <table><tr><td><code>up(1)</code></td><td>Ready to pass packets</td></tr><tr><td><code>down(2)</code></td><td>Not operative</td></tr><tr><td><code>testing(3)</code></td><td>In test mode</td></tr></table>	<code>up(1)</code>	Ready to pass packets	<code>down(2)</code>	Not operative	<code>testing(3)</code>	In test mode
<code>up(1)</code>	Ready to pass packets						
<code>down(2)</code>	Not operative						
<code>testing(3)</code>	In test mode						
Operation Status	The status of the link. This value is the same as the administration status. If the value is <code>up</code> , the link is operational.						
Last Change	The value of <code>SysUpTime</code> at the time the interface entered its current operational state. If the current state was entered prior to the last reinitialization of the local network management subsystem, then this object contains a zero value.						

Inbound Octets	The total number of octets received on the interface, including framing characters.
Inbound Unicast Packets	The number of subnetwork-unicast packets delivered to a high-layer protocol.
Inbound Non-Unicast Packets	The number of non-unicast (subnetwork-broadcast or subnetwork-multicast) packets delivered to a higher-layer protocol.
Inbound Discards	The number of inbound packets that were discarded even though no errors had been detected, preventing them from being delivered to a higher-layer protocol. One possible reason for discarding such a packet could be out of receive buffers.
Inbound Errors	The number of inbound packets that contained errors, preventing them from being deliverable to a higher-layer protocol.
Inbound Unknown Protocols	The number of packets received via the interface that were discarded because of an unknown or unsupported protocol.
Outbound Octets	The total number of octets transmitted out of the interface, including framing characters.
Outbound Unicast Packets	The total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.
Outbound Non-Unicast Packets	The total number of packets that higher-level protocols requested be transmitted to a non-unicast (a subnetwork-broadcast or subnetwork-multicast) address, including those that were discarded or not sent.
Outbound Discards	The number of outbound packets that were discarded even though no errors had been detected to prevent them from being transmitted. One possible reason for discarding such a packet could be out of transmit buffers.
Outbound Errors	The number of outbound packets that could not be transmitted because of errors.
Outbound Queue Length	The length of the output packet queue (in packets).

RFC 1284 Ethernet-Like Interface Statistics

Following are descriptions of the Ethernet-like statistics fields in the `lanadmin(1M)` command display.

Field	Description
Index	A value that uniquely identifies an interface to an 802.3 medium.
Alignment Errors	A count of frames received on a particular interface that are not an integral number of octets in length and do not pass the FCS check.
FCS Errors	A count of frames received on a particular interface that are not an integral number of octets in length and do not pass the FCS check.
Single Collision Frames	A count of successfully transmitted frames on a particular interface for which transmission is inhibited by exactly one collision.
Multiple Collision Frames	A count of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one collision.
Deferred Transmissions	A count of frames for which the first transmission attempt on a particular interface is delayed because the medium is busy. The count represented by an instance of this object does not include frames involved in collisions.
Late Collisions	The number of times that a collision is detected on a particular interface later than 512 bit-times into the transmission of a packet.
Excessive Collisions	A couple of frames for which transmission on a particular interface fails due to excessive collisions or packets dropped.
Internal MAC Transmit Errors	A count of frames for which transmission on a particular interface fails due to an internal MAC sublayer transmit error.
Carrier Sense Errors	The number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame on a particular interface.
Frames Too Long	A count of frames received on a particular interface that exceed the maximum permitted frame size.
Internal MAC Receive Errors	A count of frames for which reception on a particular interface fails due to an internal MAC sublayer receive error.

C **Gigabit Ethernet Card Statistics**

This appendix defines the card statistics that are output from the `lanadmin(1M)` command.

Card Statistics Output

The following is a sample card statistics output. An explanation of the statistics is in the section that follows.

```
***** Driver Statistics *****
In Packet Error                      0
Out Packet Error                     0
Loopback packets                     0
Link down events                     0

***** Host Command Statistics *****
nicCmdsDelMCastAddr                 0
nicCmdsSetMACAddr                   0
nicCmdsSetMulticastMode              0
micCmdsClearStats                   0

***** NIC Events Statistics *****
nicEventsFirmwareOperational         1
nicEventsStatsUpdated                362765
nicEventsLinkStateChanged            1
nicEventsMCastListUpdated            1

***** Interface Statistics *****
ifIndex                             4
ifType                              6
ifMtu                               1514
ifSpeed                             1000000000
ifAdminStatus                       1
ifOperStatus                        1
ifLastChange                        12
ifInDiscards                        0
ifInErrors                          0
ifInUnknownProtos                   0
ifOutDiscards                       0
ifOutErrors                         0
ifOutQLen                           0
ifInOctets_low                      26719576
ifInOctets_high                     0
ifInUcastPkts_low                   0
ifInUcastPkts_high                  0
ifInMulticastPkts_low               0
ifInMulticastPkts_high              0
ifInBroadcastPkts_low               382146
ifInBroadcastPkts_high              0
ifOutOctets_low                     0
ifOutOctets_high                    0
ifOutUcastPkts_low                  0
ifOutUcastPkts_high                 0
ifOutMulticastPkts_low              0
ifOutMulticastPkts_high              0
ifOutBroadcastPkts_low              0
ifOutBroadcastPkts_high              0
```


Explanation of Card Statistics

Following are descriptions of the card statistics that are output from the `lanadmin(1M)` command.

Field	Description
Driver Statistics	
In Packet Error	Number of inbound packets discarded because they were received when the driver was not operational or the packet length was incorrect.
Out Packet Error	Number of outbound packets discarded because the driver was not operational or the driver had insufficient resources (Memory) to transmit the packet.
Loopback packets	Number of packets looped back to the upper layers by the driver.
Link Down events	Number of link down events, i.e., cable disconnects processed by the driver.
Host Command Statistics	
nicCmdsDelMCastAddr	Number of times the driver has issued a command to the NIC to delete a multicast MAC address.
nicCmdsSetPromiscMode	Number of times the NIC received a command to enable or disable promiscuous mode.
nicCmdsSetMACAddr	Number of times the NIC received a command to set the current MAC address.
nicCmdsClearStats	Number of times the NIC received a command to clear the card statistics maintained by the card.
NIC Events Statistics	
nicEventsFirmwareOperational	The number of events the driver has received from the NIC indicating that the firmware on the NIC is in the operational state.
nicEventsStatsUpdated	The number of times the NIC has updated the MIB interface statistics.
nicEventsLinkStateChanged	The number of events the driver has processed indicating that the status of the link has changed.
nicEventsMCastListUpdated	The number of times the NIC generated an event to report the addition or deletion of a multicast MAC address.

Interface Statistics

These are the MIB statistics collected by the card as documented in RFC1066.

D **Hardware Reference Information**

This appendix contains information about the card LEDs, cabling requirements, and card specifications.

The Meaning of the LEDs

The Link LED indicates the card's status and must be on for the card to function properly. Note that there is no Link LED on the 1000Base-T card. In its place are three LEDs which indicate what speed (10, 100, or 1000 Mbps) the link has been established.

The following tables show the LED description and status.

Table D-1 LED Description and Status for 1000Base-SX

LED Description and Color	On (Steady)	Flashing	Off
Link - Green	Good connection between card and network at 1000 Mbps.	Port disabled by software, connection failed, or card trying to establish connection. Note: A6847A is not programmed to flash the Link LED.	No connection between card and network
ACT (Activity) - Amber	Data detected	Data detected	No data detected

Table D-2 LED Description and Status for 1000Base-T

LED Description and Color	On (Steady)	Flashing	Off
1000 - Green 100 - Green 10 - Green Note: Only one speed LED should be on at any given time.	Good connection between card and network at either 10, 100, or 1000 Mbps as indicated by LED. Note: For A4929A, if all Link speed LEDs are on steady, the driver is disabled or not installed.	N/A	No connection between card and network.
ACT (Activity) - Amber (Green on A6794A)	Data detected	Data detected	No data detected

Cabling Requirements

Connectors on LAN cards adhere to appropriate standards agreed upon by various standards bodies and are widely available. The 1000Base-SX port is compatible with the IEEE 802.3z standard and uses a single duplex SC connector. The 1000Base-T port is compatible with the IEEE 802.3ab standard and uses an RJ-45 connector.

Incorrectly wired or installed cabling is the most common cause of communications problems for local area networks. HP recommends that you work with a qualified cable installer for assistance in your cabling requirements. The following tables summarize cabling requirements:

Table D-3 Cabling Requirements for 1000Base-SX

Description (850nm short-wave laser)	Modal Bandwidth	Operating Distance
62.5 micron MMF (multimode fibre)	160 (MHz * km)	2 to 220 meters
	200 (MHz * km)	2 to 275 meters
50 micron MMF (multimode fibre)	400 (MHz * km)	2 to 500 meters
	500 (MHz * km)	2 to 550 meters

Table D-4 Cabling Requirements for 1000Base-T

Description	Bandwidth	Operating Distance
Cat 5 or Cat 5E UTP	100 MHz	Up to 100 meters

Back-to-Back Connection

When running 1000Base-T back-to-back at either 10 or 100 Mbps, you must use a crossover cable configuration. At 1000 Mbps, you can use either a crossover or straight-through cable.

Card Specifications

For compliance to European directives and related specifications, see the Declaration of Conformity statement in Appendix D.

~~A4924A/A4925A/A4926A~~

~~Physical~~

Dimensions (HSC for K):	5.625 in by 3.25 in
Dimensions (HSC for D/R):	13.375 in by 4.875 in
Dimensions (PCI):	6.73 in by 4.75 in

~~Electrical~~

Power requirement (HSC):	+15 watts max
Power requirement (PCI):	+14 watts max

~~Environmental~~

~~Temperature~~
~~Degrees F = (1.8 x Degrees C) + 32~~

Operating Temperature:	0° C to 55° C
Storage Temperature:	-40° C to 70° C

~~Humidity~~

Operating Relative Humidity Range	5 to 85% non-condensing 40° C; 16 hour dwells at extremes
Non-operating/Storage Humidity:	5 to 95% non-condensing 10° C/hour

~~Altitude~~

Operating:	10,000 ft (3.1km)
Non-operating:	35,000 ft

~~Electromagnetic Compatibility~~

FCC Class A	USA
CISPR-22/EN55022 Class A	International and Europe
EN55082-1	Europe

~~VCCI Class A (PCI card only)~~ ~~Japan~~

~~A4929A~~

~~Physical~~

~~Dimensions:~~ ~~6.73 in by 4.75 in~~

~~Electrical~~

~~Power requirement:~~ ~~+14 watts max~~

~~Environmental~~

~~Temperature~~

~~Degrees F = (1.8 x Degrees C) + 32~~

~~Operating Temperature:~~ ~~0° C to 45° C~~

~~Storage Temperature:~~ ~~-40° C to 70° C~~

~~Humidity~~

~~Operating Relative Humidity Range~~ ~~15 to 80% non-condensing~~
~~40° C; 16 hour dwells at extremes~~

~~Non-operating/Storage Humidity:~~ ~~5 to 95% non-condensing~~
~~10° C/hour~~

~~Altitude~~

~~Operating:~~ ~~10,000 ft (3.1km)~~

~~Non-operating:~~ ~~35,000 ft~~

~~Electromagnetic Compatibility~~

~~FCC Class A~~ ~~USA~~

~~CISPR-22/EN55022 Class A~~ ~~International and Europe~~

~~EN55082-1~~ ~~Europe~~

~~VCCI Class A~~ ~~Japan~~

A6825A/A6847A

Physical

Dimensions: 6.6 in by 2.5 in

Electrical

Power requirement: +8 watts max

Environmental

Temperature
Degrees F = (1.8 x Degrees C) + 32

Operating Temperature: 0° C to 50° C

Storage Temperature: -40° C to 60° C

Humidity

Operating Relative humidity range 5 to 95% non-condensing
(40° C: 16 hour dwells at extremes)

Non-operating/storage humidity: 5 to 95% non-condensing
20° C/hour

Altitude

Operating: 10,000 ft (3.1km)

Non-operating: 35,000 ft

Electromagnetic Compatibility

FCC Class A	USA
CISPR-22/EN55022 Class A	International and Europe
CISPR-24	Europe
VCCI Class A	Japan

E Hardware Regulatory Statements

This appendix contains regulatory statements for the United States, Canada, Australia/New Zealand, Japan, and the European community.

FCC Statement (For U.S.A.)

Federal Communications Commission Radio Frequency Interference Statement

WARNING

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference and
- (2) this device must accept any interference received, including interference that might cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Hewlett-Packard's system certification tests were conducted with HP-supported peripheral devices and cables, such as those received with your system. Changes or modifications to this equipment not expressly approved by Hewlett-Packard could void the user's authority to operate the equipment.

Canada

Warning: This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du règlement sur le matériel brouilleur du Canada.

EMI (Australia and New Zealand)

This product meets the applicable requirements of the Australia and New Zealand EMC Framework.



VCCI (Japan) (PCI Card Only)

This equipment complies with the Class A category for information technology equipment based on the rules of Voluntary Control Council for Interference by Information Technology Equipment. When used in a residential area, radio interference may be caused. In this case, the user may be required to take appropriate corrective actions.

Figure E-1

VCCI Regulatory Statement

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

EMI Statement (European Community)

NOTE

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case you may be required to take adequate measures.

Laser Safety Statements

Laser Safety Statements - U.S. FDA/CDRH - Optical (laser) Transceiver

CAUTION

The optical transceiver provided on the network interface card contains a laser system and is classified as a “Class-I Laser Product” under a U.S. Department of Health and Human Services (DHHS) Radiation Performance standard according to the Radiation Control for Health and Safety Act of 1968. The Class I label and compliance statement are located on the optical transceiver.

To ensure proper use of this product, please read this instruction manual carefully and retain for future reference. Should the unit ever require maintenance, contact an authorized service location.

CAUTION

Use of controls, adjustments or the performance procedures other than those specified herein may result in hazardous radiation exposure. To prevent direct exposure to laser beam, do not try to open the enclosure.

Laser Safety - European Union - Optical Transceiver Only

CAUTION

The optical transceiver provided on the network interface card contains a laser system and is classified as a “Class 1 Laser Product” per EN 60825-1, Safety of Laser products. Class 1 laser products are considered safe and do not pose a biological hazard if used within the data sheet limits and instructions.

To ensure proper use of this product, please read this instruction manual carefully and retain for future reference. Should the unit ever require maintenance, contact an authorized service location.

CAUTION

Use of controls, adjustments or the performance procedures other than those specified herein may result in hazardous radiation exposure. To prevent direct exposure to laser beam, do not try to open the enclosure.

There are no user serviceable parts nor any maintenance required for the optical transceiver. All adjustments are made at the factory before shipment to customers. Tampering with or any attempt to modify the optical transceiver will result in voided product warranty. It may also result in improper operation of the network card circuitry and possible overstress of the laser source. Device degradation or product failure may result.

Delete this graphic

DECLARATION OF CONFORMITY
according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Hewlett-Packard Company

Manufacturer's Address: 8000 Foothills Blvd.
Roseville, CA 95747
USA

declares, that the product

Product Name: 1000 Base-SX Network Interface Card

Model Number(s): A4924-60001 (HSC-K) Card (Prod. Number A4924A)
A4925-60001 (HSC-D) Card (Prod. Number A4925A)
A4926-60001 (PCI) Card (Prod. Number A4926A)

Product Options: All

conforms to the following Product Specifications:

Safety: IEC 950:1991 + A1, A2, A3, A4 / EN 60950:1992 + A1, A2, A3, A4
IEC 825-1:1993 / EN 60825-1:1994, Laser Class 1

EMC: CISPR 22:1993 / EN 55022:1994 - Class A¹
EN 50082-1:1992, Generic Immunity, including:
IEC 801-2:1991, 4 kV CD, 8 kV AD
IEC 801-3:1984, 3 V/m
IEC 801-4:1988, 1 kV Power Lines
Signal Lines Not Tested (fiber-optic cable)

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC and carries the CE marking accordingly.

1) The product was tested in a typical configuration with Hewlett-Packard information technology equipment.





Roseville, CA, June 12, 1998

Frank D. Dembski Jr., Quality Manager

European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department TRE, Herrenberger Straße 130, D-71034 Böblingen (FAX: + 49-7031-14-3143)

Delete this graphic

DECLARATION OF CONFORMITY	
According to ISO/IEC Guide 22 and EN 45014	
Manufacturer's Name:	Hewlett-Packard Company Systems Interconnect Solutions Lab
Manufacturer's Address:	8000 Foothills Blvd. Roseville, CA 95747 USA
declares, that the product	
Product Name:	Gigabit Ethernet 1000BaseT
Model Number(s):	A4929-60001 (Product No. A4929A)
Product Options:	All
conforms to the following Product Specifications:	
Safety: IEC 950:1991 + A1, A2, A3, A4 / EN 60950:1992 + A1, A2, A3, A4, A11 GB 4943-1995	
EMC: CISPR 22:1993 / EN 55022:1994 & A2 1996 - Class A ¹ CNS 13438, GB 9254-1988, CFR47, Part 15 Class A CISPR 24:1997 / EN 55024:1998 IEC 61000-4-2 IEC 61000-4-3 / ENV 50204 IEC 61000-4-4 IEC 61000-4-6 IEC 61000-4-8	
Supplementary Information:	
The product herewith complies with the requirements of the EMC Directive 89/336/EEC and carries the CE marking accordingly.	
1) The Product was tested in a typical configuration with Hewlett-Packard information technology equipment.	
	
Roseville, CA, March 30, 2000	Frank D. Dembski Jr., Quality Manager
European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department HQ-TRE, Herrenberger Straße 130, D-71034 Böblingen (FAX: + 49-7031-14-3143)	

DECLARATION OF CONFORMITY According to ISO/IEC Guide 22 and EN 45014	
Manufacturer's Name:	Hewlett-Packard Company Systems Interconnect Solutions Lab
Manufacturer's Address:	8000 Foothills Blvd. Roseville, CA 95747 USA
declares, that the product	
Product Name:	PCI 1000BT / PCI 1000SX
Model Number(s):	A6825A and A6847A
Product Options:	All
conforms to the following Product Specifications:	
Safety:	IEC 950:1991 + A1, A2, A3, A4 / EN 60950:1992 + A1, A2, A3, A4, A11 GB 4943-1995. IEC 825-1:1993/ EN60825-1:1994+A1, Class 1 Laser
EMC:	CISPR 22:1997 / EN 55022:1998 - Class A CNS 13438, GB 9254-1988, CFR47, Part 15 Class A CISPR 24:1997 / EN 55024:1998 IEC 61000-4-2 IEC 61000-4-3 / ENV 50204 IEC 61000-4-4 IEC 61000-4-6
Supplementary Information:	
The product herewith complies with the requirements of the EMC Directive 89/336/EEC and carries the CE marking accordingly.	
1) The Product was tested in a typical configuration with Hewlett-Packard information technology equipment.	
<div style="text-align: right;"> ----- Tom Le, Hardware Engineer</div>	
Cupertino, CA, April, 2002	
European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department HQ-TRE, Herrenberger Straße 130, D-71034 Böblingen (FAX: + 49-7031-14-3143)	

